DOCUMENT RESUME

ED 474 606 UD 035 553

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TITLE	Does Education Improve Citizenship? Evidence from the U.S. and the U.K. Working Paper.
INSTITUTION	National Bureau of Economic Research, Cambridge, MA.
REPORT NO	NBER-WP-9584
PUB DATE	2003-03-00
NOTE	38p.
AVAILABLE FROM	National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138. Web site: http://www.nber.org/papers/w9584.
PUB TYPE	Reports - Research (143)
EDRS PRICE	EDRS Price MF01/PC02 Plus Postage.
DESCRIPTORS	*Citizenship Responsibility; *Educational Attainment; Elementary Secondary Education; Foreign Countries; *Outcomes of Education; Political Attitudes; Public Education; Voter Registration; *Voting
IDENTIFIERS	United Kingdom

ABSTRACT

This paper explores the effect of extra schooling, induced through compulsory schooling laws, on the likelihood of becoming politically involved in the United States and the United Kingdom. U.S. data come from the annual National Elections Studies and the November Current Population Surveys. U.K. data come from the British General Election Studies and the Eurobarometer Surveys. Results find that educational attainment relates to several measures of political interest and involvement in both countries. For voter turnout, there is a strong, robust relationship between education and voting for the United States, but not for the United Kingdom. This is largely due to differences in voting registration across education groups. Using information on validated voting, results find that misreporting of voter status cannot explain the estimates. Results suggest that the observed drop in voter turnout in the United States from 1964-2000 would have been 10.4-12.3 percentage points greater if high school attainment had stayed at 1964 rates, holding all else constant. However, when conditioning on registration, U.S. results approach U.K. findings. This may indicate that registration rules present a barrier to low-educated citizens' participation. (Contains 33 references.) (SM)

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NBER WORKING PAPER SERIES

DOES EDUCATION IMPROVE CITIZENSHIP? EVIDENCE FROM THE U.S. AND THE U.K.

Kevin Milligan
Enrico Moretti
Philip Oreopoulos

Working Paper **9584**
http://www.nber.org/papers/w9584

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 2003

We are grateful to Joshua Angrist and Daron Acemoglu for providing their compulsory schooling data. We thank participants of UBC's empirical lunch workshop for many helpful comments. We also thank Fred Cutler, Sonia Laszlo and Michael Smart for their comments on an earlier draft. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

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Does Education Improve Citizenship? Evidence from the U.S. and the U.K.
Kevin Milligan, Enrico Moretti, and Philip Oreopoulos
NBER Working Paper No. 9584
March 2003
JEL No. I2

ABSTRACT

Many economists and educators of diverse political beliefs favor public support for education on the premise that a more educated electorate enhances the quality of democracy. While some earlier studies document an association between schooling and citizenship, little attempt has been made to address the possibility that unobservable characteristics of citizens underlie this relationship. This paper explores the effect of extra schooling induced through compulsory schooling laws on the likelihood of becoming politically involved in the US and the UK. We find that educational attainment is related to several measures of political interest and involvement in both countries. For voter turnout, we find a strong and robust relationship between education and voting for the US, but not for the UK. Using the information on validated voting, we find that misreporting of voter status can not explain our estimates. Our results suggest that the observed drop in voter turnout in the US from 1964 to 2000 would have been 10.4 to 12.3 percentage points greater if high school attainment had stayed at 1964 rates, holding all else constant. However, when we condition on registration, our US results approach the UK findings. This may indicate that registration rules present a barrier to low-educated citizens' participation.

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1 Introduction

The commonwealth requires the education of the people as the safeguard of order and liberty.

-- Inscription above the entrance to the Boston Public Library.

A large body of research in the last 30 years shows that schooling has a significant private return in terms of increased earnings. Yet, it is possible that education creates other benefits to society that are not reflected in the earnings of the educated. One potentially important example of such positive externalities of education is enhanced political behaviour. Economists, educators and politicians commonly argue that one of the benefits of education is that a more educated electorate enhances the quality of democracy. If this is true, then education has social benefits over and above the private return, and Pigouvian subsidies for education may produce more efficient education acquisition decisions.

Interestingly, the argument that education generates positive externalities through its effects on political behavior is not raised only by those who support a larger role for the government.[1] The same argument resonates with noted advocates of a limited role for government, such as Adam Smith and Milton Friedman.[2] For example, Friedman (1962) argues that

> "A stable and democratic society is impossible without a minimum degree of literacy and knowledge on the part of most citizens and without widespread acceptance of some common set of values. Education can contribute to both. In consequence, the gain from education of a child accrues not only to the child or to his parents but also to other members of the society. [...] Most of us would probably conclude that the gains are sufficiently important to justify some government subsidy."

Why might education affect political behavior? The benefit of education may accrue either through the enhanced quality of participation by a given subset of citizens, or through broader

[1] For example, the Center on Education Policy, a liberal think thank that promotes public schools, argues that "The survival of a representative democracy like the United States ultimately depends on having a large group of well-educated citizens." Schools prepare students to be good citizens in three ways: "(1) teach students about the role of government in the United States; (2) uphold civic values by teaching students to be good citizens; (3) equip students with the civic skills they need to be effective participants in a representative democracy".

[2] Smith (1776) emphasizes the benefits of increased cognitive capacity among the "common people", claiming that "They are more disposed to examine, and more capable of seeing through, the interested complaints of faction and sedition, and they are, upon that account, less apt to be misled into any wanton or unnecessary opposition to the measures of government."

participation among the citizenry. The first channel is important if education equips citizens with the cognitive skills they need to be effective participants in a representative democracy. In this case, education increases citizens' ability to select able leaders, understand the issues upon which they will vote, act as a check on the potential excesses of the government, and recognize corruption in leaders.

The second channel is important if education improves citizens' interest and knowledge of political issues, their involvement in the political process and, ultimately, the effectiveness of their political participation. Economists commonly argue that education provides important social benefits through enhanced civic participation. Hanushek (2002), among many others, makes this argument in his survey of public education.[3]

In our paper, we focus on this second channel. Although establishing the link between schooling and the quality of political choices would be potentially more interesting, such a topic is hard to investigate empirically. We can think of no way to measure objectively the quality of decisions made by the electorate.

We empirically test whether schooling improves civic participation in the United States and the United Kingdom, as measured by the probability of voting.[4] We also test whether more educated voters have better information on candidates and campaigns.[5] Finally, we test whether education increases other measures of political participation, such as the probability of attending political or community meetings, working on community issues, and more in general, being politically active.[6]

To account for unobserved characteristics of individuals that may affect both schooling and political participation, we use an instrumental variable strategy. We measure the effects of schooling

[3]There are several theoretical models that suggest a link between education and civic participation. Verba and Nie (1972) argues that individuals with higher socioeconomic status may have higher cognitive skills, benefit from the higher effectiveness of their participation, possess more knowledge about the issues, or be influenced by peer effects from other high SES individuals. It is also possible that skills acquired from additional schooling may help an individual overcome the bureaucratic inconveniences and difficulties in registering to vote (Wolfinger and Rosenstone (1980)). Feddersen and Pesendorfer (1996) develop a positive model in which low-education voters prefer to abstain so that the votes of better-informed voters will carry more weight. In their model the non-voting of the low-educated is a result of their *relative* lack of education— providing more education to them will only increase voting if the education level of the rest of society stands still. This approach contrasts with the emphasis in Verba and Nie (1972) and Wolfinger and Rosenstone (1980)) on *absolute* levels of education.

[4]Our focus on the United States and the United Kingdom derives from two reasons. First, both countries offer adequate microdata surveys to study the questions we ask. Second, our instrumental variable strategy requires clear, identifiable, and binding changes in compulsory schooling laws.

[5]This evidence speaks, at least indirectly, to the issue of quality of political choice.

[6]At a late stage in the preparation of our manuscript, we became aware of a similar paper to ours, Dee (2002). Although the data sources and some outcome variables are different, the question addressed by the paper is similar to ours.

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through changes in compulsory school laws across different regions at different times. The approach identifies the effect of schooling on citizenship from extending duration in school for would-be-dropouts.

We find a strong effect of education on voting in the US. The effect appears largely to be accounted for by differences in voting registration across education groups. Results from the UK, where persons are legally responsible and actively assisted to register, show little effect of education on voting. We also find strong and persistent effects of education on civic behavior in both the US and the UK. Better educated adults are more likely to follow election campaigns in the media, discuss politics with others, associate with a political group, and work on community issues.

Misreporting is well known to be prevalent in voting turnout data. One concern is that our finding could simply reflect an higher probability of over-reporting voting among educated individuals. Using information on the validation of voting status of respondents based on official voting records, we directly test whether misreporting by survey respondents affects our conclusions on the relationship between voting and education. We conclude that misreporting is not systematically correlated with education and therefore does not affect our estimates.

Overall, our results for the US lend support to the argument that education generates positive externalities in the form of enhanced political behaviour. Our findings indicate that education benefits a representative democracy both by increasing the quantity of citizens' involvement in the electoral process (increased probability of voting) as well as the quality of their involvement (increased information on candidates and political parties).

Below, we begin by giving some background on registration and voting in the US and the UK and describing the data sources we employ. Sections 4 and 5 provide the empirical results for voting and for other civic outcomes, respectively. We conclude the paper with a discussion of the implications of our results.

2 Voting and Registration

A vast body of empirical research in political science has studied civic participation. Verba and Nie (1972) provides some of the first micro-empirical evidence of a strong link between socio-economic status (SES) and political participation. Wolfinger and Rosenstone (1980) break down SES into separate income and education effects and find the influence of education to be stronger

than income.[7] Powell (1985) suggests that the SES-participation link is much stronger in the US than in other industrialized countries. An important weakness of the existing evidence lies in the treatment of causality. Lacking a strategy to address the potential endogeneity of schooling, the evidence available in the existing literature offers little firm evidence on the causal nature of the relationship.[8]

In order to understand the institutional context in which voting decisions are made, we provide some detail on voting and registration for each of the two countries we study.

The responsibility of registering to vote in the US rests mainly with the individual. Each state determines its own registration laws, subject to certain limitations imposed at the federal level. At the time our data was collected, most states required registering directly at specific regional offices, during particular hours. Some states required registering more than a month in advance of an election, and some offices were open only during working hours (Wolfinger and Rosenstone (1980)). Many states made it easier to register through the 1970s by allowing mail-in registration and registration while renewing drivers' licenses. In 1993, the National Voter Registration Act (commonly called the 'motor-voter law') was passed federally, mandating mail-in and agency-based registration in all states.

How does registration affect voting? Registration raises the costs of voting, and particularly affects those who find it difficult to deal with bureaucratic hurdles associated with the process. Procrastinators may also be affected by registration, as voters must plan to vote well in advance. If the low-educated are less motivated or less able to overcome these barriers, then registration is predicted to adversely affect their voting turnout behavior.

Empirical analysis of these reforms suggest a modest effect on voter turnout. Knack (1995) analyzes the 1970s and 1980s variation in registration laws and finds a positive effect on registration, and that about half of the new registrants vote. Martinez and Hill (1999) looks at the 1992 and 1996 elections, finding little evidence of an impact of the 1993 federal motor-voter law. Highton (1997) compares states with high registration barriers to states with low barriers, finding that the effect of

[7] Teixeira (1987), Leighley and Nagler (1992), and Weisberg and Box-Steffensmeier (1999) empirically demonstrate the persistence of these effects through the 1980s and 1990s. Helliwell and Putnam (1999) study the effect of education on various measures of social engagement, finding that individual education has a much stronger affect than aggregate measures of education.

[8] One exception is Brady et al. (1995), in which the authors examine the potential endogeneity of political interest using religious engagement, parents' education, and other variables as instrumental variables. However, it seems likely that these instruments could be related to unobserved heterogeneity in political activity; that they are jointly determined.

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the barriers is modest, but hits harder among low-educated voters. Finally, Flanigan and Zingale (2002) argues that if registration expansions lead to low-interest citizens becoming registered, little impact may be seen on voter turnout.

Unlike the United States, the responsibility to maintain the electoral register in Britain rests with local government officials.[9] As a consequence, only 5.9 percent of the British electorate are currently not registered.[10] The process for compiling the register explains this low fraction. Each year, Electoral Registration Officers update the register. A form is sent to every household in a region asking for the householder to indicate the names of all those in the household qualified to be included on the list. If a reply is not received a reminder is delivered and then a personal visit made to all households who have not returned at least one form. Although electors have the right not to vote, they incur a fine for failing to return a completed form or for giving false information. The penalty was first imposed in 1918, with the current fine for this offence not exceeding 1000 pounds (United Kingdom (2002)).

3 Data

We examine voting behavior and other citizenship outcomes in the United States using the annual National Elections Studies and the November Current Population Surveys. We use the British General Election Studies and the Eurobarometer Surveys for our UK analysis. Below, we describe these datasets. We also discuss the issue of measurement error in citizenship variables, and describe how we address this issue in the empirical analysis.

3.1 US Data sets

The two datasets we employ for the US complement each other in many ways. Our primary source of data is the complete set of pooled biannual National Election Studies (NES) compiled by Shapiro et al. (2001), spanning the period 1948 to 2000. These data are the premier source for analysis of voting behavior in the United States, and are used regularly for empirical studies by political scientists. The survey is collected with telephone and in-person interviews, before and after the election. The dataset pulls together demographic information on the respondent with a wide and deep variety of questions about political affiliations, voting behavior, knowledge, and

[9]The responsibility dates back to the passage of the Representation of the People Act of 1918.
[10]This figured is based on verified reports in the 1997 British Election Study.

attitudes. Importantly for our instrumental variables strategy, the survey reports the state in which the respondent received his or her education. The sample size for the survey ranges from 662 in 1948 up to 2485 in 1992. We select only those individuals with valid responses to the variables we use. Since some questions weren't asked in all years, the exact number of observations varies across specifications.

The key voting turnout measure we employ is formed from a question in the NES about voting in the November elections. From 1978 on, the question in the survey was: "In talking to people about the election we often find that a lot of people weren't able to vote because they weren't registered or they were sick or they just didn't have time. How about you, did you vote in the elections this November?" The wording of the question changed only slightly through the time period we study. As well, no differentiation is made among votes for different offices that may be up for election on election day. From this question we form a binary variable for self-reported voter turnout.

We complement our use of the NES with the 1994 to 2000 waves of the November voting supplement to the Current Population Survey (CPS). The CPS allows us to form variables for being registered and having voted, but no broader citizenship measures. While it reports the current state of residence, we do not observe the state in which the individual grew up. This means that the assignment of school leaving laws must assume that there has been no migration since childhood. We keep only those observations with valid responses to the variables we use. The primary advantage of the CPS is its sample size, totalling 218,865 over the four waves we use.

3.2 UK Data sets

Two datasets comprise our sources for Great Britain. First, the British Election Studies (BES) collect data for describing and explaining the outcome of general elections. The surveys have been taken immediately after every general election in Britain since 1964, as well as during two non-election years. We combine the survey years for 1964, 1974, 1979, 1983, 1987, 1992, and 1997.[11]

The combined dataset contains information on gender, age, age finished full-time education, and voting behavior, with a total sample of 17,825 adults aged 18 or older, who reached age 14 between 1925 and 1990. The BES is the only study in the UK to ask a large sample of adults whether they voted or not during the past general election. As with the NES, for most of the survey years,

[11] We omit the 1969 study for lack of a comparable education attainment variable.

individuals were checked for the accuracy of their response on voting behavior by consulting actual Electoral Register records. Verifying survey records with marked and unmarked Electoral Registers provides a rare opportunity to investigate response bias and, importantly, whether misreporting relates to education attainment or other observable characteristics.

Except for 1997, the BES is not a representative sample of the British population, but instead a sample of those on the electoral register and eligible to vote. The sample is drawn from the register itself. Thus, results from the combined datasets are conditional on being in the register. An analysis using a nationally representative sample is possible using the 1997 BES. For 1997, the sample was drawn from a household address list rather than from the electoral register. Using this survey year only, however, reduces the total sample size to 3,390.

Our second source of UK data is the Eurobarometer survey. The Eurobarometers were first assembled in 1970 by the Commission of the European Community, and are designed to track opinions and attitudes among European citizens. Each nationally representative survey contains a sample of about 1,000 individuals from Britain, and 300 individuals from Northern Ireland. Surveys are carried out more than once a year, from 1973 to 1998. A total of 50 surveys are combined to create a dataset with 63,858 individuals who reached age 14 at some point between 1925 and 1990.

The Eurobarometers contain many questions on voting preferences and political activity. Respondents were interviewed and asked, "When you hold a strong opinion, do you ever find yourself persuading your friends, relatives, or fellow workers to share your views?" and, "When you get together with friends, would you say you discuss political matters frequently, occasionally, or never?" Interviewers also asked questions about how often respondents watch news on television or read a newspaper, and whether they consider themselves close to any particular party. The Eurobarometers also collect demographic information on age, age finished full time education, and gender.

The Eurobarometers do not contain information on voter turnout, but they do contain a multitude of questions about political and citizenship activity. Another advantage is the inclusion of Northern Ireland in the survey. Residents of Northern Ireland experienced the same changes in the minimum school leaving law as did residents of Britain, but at different times. This allows identification of education effects through differences in the timing of minimum school-leaving age changes for the same birth cohort across the two parts of the United Kingdom. In contrast, with the BES we identify the effects of education through school-leaving ages faced by different cohorts in Britain.

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3.3 The issue of misreporting

We explore the effect of education on citizenship within the following econometric framework:

$$Y_{it} = \beta' X_{it} + \gamma' Q_{it} + \epsilon_{it}, \tag{1}$$

where Y_{it} represents an observed citizenship outcome (for example whether the respondent voted in the last elections), X_{it} is a vector of observable characteristics, Q_{it} is a vector of unobservable characteristics, and ϵ_{it} is the error term. The observed citizenship outcome Y_{it} can be further decomposed as follows:

$$Y_{it} = Y_{it}^{*} + u_{it}. \tag{2}$$

The true value of the citizenship outcome is Y_{it}^{*} and u_{it} is a measurement error term. If the measurement error is correlated with X_{it}, then the estimate of β will be biased. One source of misreporting that could be correlated with schooling is the potential for embarrassment. For example, an individual might not wish to admit not having voted to those conducting the survey, so he or she offers an untruthful response in order to avoid embarrassment. If misreporting is systematically related to educational attainment, then the estimate of β will be biased, as the estimated β will pick up the propensity to misreport rather than the true effect of education on Y_{it}^{*}.

While misreporting is a general problem for any empirical estimates based on survey data, misreporting is well-known to be prevalent in voting turnout data.[12] Although some degree of misreporting is likely to plague many surveys, there are very few examples of datasets where some form of exogenous data validation is available. One important feature of our data is the validation of voting status of respondents using official voting records. With the information on validated voting, we can provide a direct analysis of misreporting. Specifically, in section 4 we directly test whether misreporting by survey respondents affects our conclusions on the relationship between voting and education. We conclude that misreporting is not systematically correlated with education, and therefore our results on voting are not affected.

[12]The political science literature on the correlation between misreporting and schooling important issue is mixed. Wolfinger and Rosenstone (1980) conclude (p. 118) that ". . . misreporting is not strongly related to demographic characteristics." Burden (2000) presents a recent analysis of misreporting bias, noting that ". . . many researchers find that replacing self-reported turnout with validated voter turnout in multivariate analyses does not change the substantive conclusion reached." In contrast, Silver et al. (1986) and Leighley and Nagler (1992) find that among those not voting, misreporting is higher for high SES respondents.

A second type of misreporting may be a problem for our broader indicators of civic participation. Some of these outcomes are not connected with a specific action (voted/not voted), but describe subjective opinions of the respondent. For these outcomes, the absence of a pre-existing opinion may be another source of measurement error. Bertrand and Mullainathan (2001) explain that individuals may need to expend mental resources in order to form an opinion. Those who have not previously thought about an issue may therefore truthfully report a 'wrong' opinion; an unconsidered opinion that might change upon further reflection. Again, if this type of 'soft opinion' measurement error is correlated with education, our estimate of the impact of education on citizenship outcomes would be biased.

For the citizenship outcomes we study, we separate the results into the two categories of *actions* and *attitudes*. We contend that soft-opinion bias is less likely to arise in response to questions about past actions than to questions about attitudes. This holds if fewer mental resources need to be expended in the recollection of past actions than in the formation of abstract opinions. To the extent that the soft-opinion bias influences our estimates, we take greater caution in the interpretation of the attitudes results.

4 The Effect of Education on Voting

We now turn to the empirical evidence. We begin by looking at differences in the average probability of voting by educational attainment, and subsequently extend the analysis to control for observable and unobservable heterogeneity across education groups. In general, we find that in the US, more educated citizens appear to be more likely to vote, while this is not true in the UK. Furthermore, we show that the difference in voting probability across education groups that we uncover in the US is unlikely to be due to differential misreporting of voting status. Much of the estimated effect of education on voting appears due to registration differences. We find that when we condition on being registered to vote, the remaining effect of schooling on voting in the US drops to less than a third of the estimated effect based on the whole sample.

Of course, the effect on citizenship may be through income if education increases lifetime earnings. Any differences we uncover across educational attainment groups could be attributed to the higher income that resulted from more education, rather than to some direct component of education. Our approach does not have the power to test among competing mechanisms that potentially

explain *how* education affects civic behavior. Instead, we focus on quantifying the magnitude and confirming the existence of the relationship, rather than identifying the exact mechanism.

4.1 Unconditional Means

Table 1 analyzes differences in the self-reported probability of voting across education groups. The first column in the top panel indicates that, in the United States, individuals with more schooling are more likely to report having voted in the last election. While only 52 percent of U.S. high school dropouts report voting, this percentage increases to 67 percent for high school graduates, 74 percent for individuals with some college and 84 percent for college graduates. These results are consistent with previous findings in the political science literature. Interestingly, when we include only individuals who are registered to vote (column 2), the differences in voting rates across groups significantly decline. For example the difference in the probability of voting between high school drop outs and high school graduates is 15 percentage points in the full sample, but drops to 5 percentage points in the sample of registered voters. Similarly, the difference in the probability of voting between high school drop outs and college graduates is 32 percentage points in the full sample, but only 10 percentage points in the sample of registered voters.

The self-reported probabilities of voting in column 1 are higher than official turnout rates in recent elections. There are two reasons why the self-reported voting probabilities appear to be so high. First, they are based on every general election since 1948. While turnout rates are currently low, they used to be significantly higher in the 1950s and 1960s. For example, the turnout rate in the 1960 presidential election was 63 percent, while the turn out rate in the 1996 presidential election was only 49 percent. The second reason is misreporting. Some respondents may be reluctant to admit that they did not vote. If the probability of misreporting is random across individuals, it will reduce the precision of our estimates, but it will not bias our estimates. On the other hand, it is possible that more educated individuals are more likely to feel the stigma of not having voted and therefore are more likely to over-report voting. In this case, the strong relationship between schooling and voting documented in column 1 could simply reflect differences across education groups in the probability of misreporting.

One strength on the NES is that, for a selected number of years, the voting status of respondents was validated using official voting records.[13] Voting and registration records were checked in the

[13]Specifically, vote validation studies were conducted in 1964, 1976, 1978, 1980, 1984, 1986, 1988, and 1990.

jurisdiction in which the respondent was living when the survey was conducted. For those who were registered outside the current jurisdiction of residence, attempts to contact the proper jurisdiction by phone were made.

With the vote validation variables, we are therefore in the rare position of being able to test whether misreporting by survey respondents affects our conclusions. In particular, we can test whether more educated individuals are more likely to over-report voting participation. Columns 3 and 4 show the validated probability of reporting, using the subsample of years in which responses were validated. The same positive gradient of voting with education appears in the validated data. This suggests that misreporting may not be correlated with education in our data. To examine this more directly, we show in Columns 5 and 6 the probability of misreporting by education group. We create a misreporting dummy, which is equal to 1 if the respondent reports having voted and official records indicated that she did not vote, or if the respondent reports not having voted and official records indicated that she did vote. The great majority of misreporting cases are cases where respondents report having voted and official records indicate that they actually did not vote.

Column 5 shows that, if anything, more educated individuals are slightly *less* likely to misreport. The probability of misreporting is between 18 to 20 percent for high school dropouts, high school graduates, and individuals with some college. For college graduates, the misreporting rate drops to 14 percent. A similar finding emerges from column 6, where we show the probability of misreporting for registered voters.

From this analysis, we conclude that, although misreporting is not uncommon in our sample, it is unlikely to introduce any significant upward bias in our estimates of the effect of schooling on voting participation. If validated information on voting were available for all the elections, we would use the validated information instead of the self-reported data. However, validated voting is available only for a limited number of years. For this reason, throughout the paper we use self-reported voting as our preferred dependent variable, although later in the paper we also show that our results don't change much if validated voting is used instead.

The bottom panel in Table 1 shows similar conditional means for the UK. The comparison between UK and US data is complicated by the fact that our UK data report the age when the respondent finished school. This variable for educational achievement has the advantage, however, that it can be matched closely with changes to the minimum school leaving age.

There is much less discrepancy in voting patterns between the population sample (using only the

1997 BES) and the registered sample (using the combined BES). The fraction voting is somewhat U-shaped by education level. 85 percent of the British electorate who finished school at age 14 reports voting in the last general election survey. The proportion reporting they voted falls slightly below 80 percent for those who finished school between ages 15 and 17, and the proportion of British that finished school past age 17 increases to 84 percent. In the UK, like in most European countries, all citizens are registered and required to vote. Conditioning on registration, therefore, does not significantly change the fraction of the population voting. For registered voters who finished school at age 14 or earlier, the voting rate is 88 percent. The corresponding figures for those who finished school at 15, 16 17 and 18 or more are 85, 83, 87 and 88 percent, respectively.

Similar to the US, the probability of misreporting does not appear to be systematically correlated with schooling achievement. The fraction misreporting ranges from 13 to 18 percent across education categories for the full (1997) sample. The actual fraction of the British electorate that vote is distributed about the same across education groups as the self-reported fraction, ranging between 62 percent for those finishing school at age 16 and 69 percent for those finishing school at age 14 or less.

Although we don't report the figures in the table, a similar picture emerges if one looks at Canadian data.[14] In Canada, the probability of voting is 0.83 for high school drop outs, 0.84 for high school graduates, 0.86 for individuals with some post-high school education and 0.90 for university graduates. The registration process resembles more closely that in Britain than the US, adding to our suggestive evidence that the relationship between education and voting has most to do with the relationship between education and electoral registration.[15] In the remainder of the paper, we focus on US and UK, as our instrumental variables work best in these two countries. However, we do refer to OLS estimates for Canada below.

4.2 Evidence from the United States

In the previous section we showed that more educated individuals are more likely to vote in the US. However, this documented correlation between schooling and voting might not be causal. There are

[14] We pooled together the Canadian Election Studies from 1988, 1993, 1997, and 2000, using the same variables as we used for the US. The total number of observations with valid variables was 8044.

[15] Since 1982 Canadians can register to vote by checking a box on their individual tax return form (that almost every adult must file each year). Prior to an election, a postcard is delivered to each household confirming registration and showing where to vote. Electors who did not receive a card can phone to be placed on the list. Elections Canada established a permanent register of electors in 1997.

many individual characteristics that affect both schooling achievement and political participation, creating spurious correlation. In the next two sections, we turn to a more formal analysis of the relationship between education and voting, and we try to account for observable and unobservable individual characteristics that may be correlated with schooling and voting.

4.2.1 National Election Survey results

Table 2 shows OLS regressions based on NES data. The independent variable of primary interest is a dummy equal to one if the respondent has a high school education or more. The first column indicates that after conditioning on year effects and a fourth order polynomial in age, the difference in the probability of voting between high school drop outs and individuals with 12 or more years of schooling is 21 percentage points. When we include race and gender (column 2), this difference increases to 28 percentage points. When we also control for state of birth effects (column 3) and linearly for the year of birth of the respondent, the coefficient is 0.25.[16]

Columns 5 to 8 report estimates from similar models obtained by including only individuals who are registered to vote. Consistent with our findings in Table 1, conditioning on registration significantly reduces the coefficient for high school graduation. The most robust specification in column 8 suggests that the difference in the probability of voting between high school dropouts and individuals with 12 or more years of schooling is 9 percentage points, or about a third of the corresponding coefficient in column 4. These results are consistent with existing evidence that finds the effect of education on turnout diminishes among the registered (e.g. Highton (1997)) .

Note that the information on registration is missing in some years, so that the sample used in columns 1 to 4 is different from the sample used in columns 5 to 8. To make sure that the documented difference in results is not driven by differences in the sample, we re-estimate the models in column 1 to 4 using only the years when information on registration is available. We find results that are very similar to the ones reported in columns 1 to 4.[17]

It is possible that our OLS estimates are biased by unobserved characteristics that are associated with schooling and outcomes. For example, parents who encourage their children to pursue more

[16] For all regressions in the paper when we control for the year of birth, we use a linear term rather than year of birth dummies. In the CPS, both the OLS and the IV results are robust to the inclusion of a set of year of birth dummy variables. However, in the NES, the small sample sizes weaken the power of the instruments in the presence of a set of year of birth dummies. To maintain comparability, we control linearly for year of birth effects across all the datasets we use.

[17] For example, the coefficient on high school graduation for the model in column 4 estimated using only the years when information on registration is available is 0.28 (0.13).

education might also nurture strong civic values. If so, the unobserved parental influence could lead to a positive bias in the estimate of the effect of schooling on voting.

One potential solution to this problem is to find a set of instrumental variables that are related to voting only through their impact on schooling. We use mandatory schooling laws as instruments.[18] States changed their mandatory schooling laws at different times, generating variation across cohorts and jurisdictions in exposure to the laws. If this variation leads to higher educational attainment, but is unrelated to citizenship outcomes, then mandatory schooling laws are valid instruments.

Years of compulsory attendance are defined as the maximum between (i) the minimum number of years that a child is required to stay in school and (ii) the difference between the earliest age that he is required to be in school and the latest age he is required to enroll. Child labor laws are defined as the earliest grade in which children are allowed to leave school to enter the labor market. In the years relevant for our sample, 1914 to 1990, states changed compulsory attendance levels and child labor laws several times, and not always upward.[19] We assign compulsory attendance laws and child labor laws to individuals on the basis of state of residence at age 14 and the year when the individual was 14 years old.[20]

The effect of compulsory schooling laws and child labor laws on schooling is well documented (see for example Acemoglu and Angrist (2000), Lochner and Moretti (2001) and Lleras-Muney (2002b)). Increases in compulsory schooling and in child labor laws have been shown to affect educational attainment, controlling for state and year of birth. Our first stage estimates are consistent with findings in the existing literature. The top panel in Table 3 quantifies the effect of compulsory attendance laws and child labor laws on educational achievement in the NES. For compulsory attendance laws, we create four indicator variables, depending on whether years of compulsory

[18]This type of instrument has been used previously by Acemoglu and Angrist (2000) to study the social return to education, Lochner and Moretti (2001) to study crime, Lleras-Muney (2002a) to study adult mortality, Oreopoulos (2003) to study well-being, and in the study of labor market outcomes by Angrist and Krueger (1991), Harmon and Walker (1995), and Meghir and Palme (2001).

[19]The most dramatic examples of downward changes are South Carolina and Mississippi, who repealed their compulsory attendance statutes following the forced integration of schools in order to avoid requiring white children to attend racially mixed schools. Within the following decade, South Carolina re-enacted a compulsory attendance statute, although it was weakened by provisions making the statute a mere enabling act which could be utilized at local option (Kotin and Aikman (1980)). See Lochner and Moretti (2001) for more details on changes in compulsory schooling laws.

[20]The data sources for compulsory attendance laws are given in Appendix B of Acemoglu and Angrist (2000). We use the same cut off points as Acemoglu and Angrist (2000) and Lochner and Moretti (2001). We experimented with a matching based on the year the individual is age 16 or 17, and found qualitatively similar results.

attendance are 8 or less, 9, 10, and 11 or 12. For child labor laws, we create four indicator variables, depending on whether the minimum number of years of school before work is permitted is 6 or less, 7, 8, and 9 or more. All models include controls for age, election year, state of birth, and year of birth.[21]

Identification of the estimates comes from *changes* over time in the number of years of compulsory education or child labor laws in any given state. The identifying assumption is that conditional on state of birth, cohort of birth and election year, the timing of the changes in compulsory attendance laws within each state is orthogonal to characteristics of individuals that affect voting, like family background or tastes. Columns 1 to 3 indicate that, in general, the more stringent the compulsory attendance legislation or the child labor law legislation, the higher is the probability of high school graduation. For example, individuals who were 14 in states and years requiring 11 or more years of compulsory attendance, are 7.5 percentage points more likely to have at least high school compared with individuals who were 14 in states/years requiring 8 years or less (the excluded case). (The relationship between high school graduation and compulsory schooling is not perfectly monotonic, possibly because there are few individuals in the state years where compulsory schooling is equal to 10). Similarly, individuals who were 14 in states and years requiring 9 or more years of schooling before work are 8.5 percentage points more likely to have at least high school compared with individuals who were 14 in states/years requiring 6 years or less (the excluded case).

Are compulsory schooling laws valid instruments? We start to address this question by asking whether increases in compulsory schooling ages are associated with changes in political attitudes that may affect voter turnout. If increases in mandatory schooling correspond with increases in political participation, IV estimates might be too large. Similarly, changes in schooling laws may be correlated with civil rights changes that made registration easier. However, we do not believe this to be a serious problem. In contrast to most studies using state policy changes as an instrument, *simultaneous* changes in compulsory schooling laws and changes in political attitudes are not necessarily problematic for the instrument in this study, since we examine voting behavior among individuals many years after schooling laws. Recall that we assign compulsory attendance based on the year an individual is age 14, and our sample only includes individuals ages 20 and older. For the instrument to be invalid, changes in state political attitudes that take place when

[21] More precisely, we include a dummy if the voter is female, a dummy if the respondent is black, a linear trend in year of birth, a four term polynomial in age, dummies for each election year, and dummies for each state of birth. The standard errors we use allow for clustering at the state of birth and year of birth level.

an individual is age 14 must directly affect her voting behavior years later. In general, this does not appear to be a likely scenario.

Another important concern with using compulsory attendance laws as an instrument is that the cost of adopting more stringent versions of the laws may be lower for states that expect faster increases in high school graduation rates. It is, therefore, possible that changes in compulsory attendance laws simply reflect underlying state-specific trends in graduation rates. This issue has been extensively examined by previous research, which has shown that changes in compulsory schooling laws do not appear to simply picking up underlying trends in education. Stricter compulsory attendance laws appear to raise education, not vice versa. (See Lochner and Moretti (2001) and Lleras-Muney (2002b).

The bottom of Table 3 reports instrumental variable estimates of the effect of high school graduation on voting. Column 1 uses only compulsory schooling laws as instruments, column 2 uses only child labor laws, and column 3 uses both. Irrespective of the instruments used, the IV estimates are very similar to OLS estimates. The IV coefficient on high school graduation is between 0.28 and 0.30, statistically indistinguishable from the corresponding OLS coefficient.

Columns 4 to 6 report estimates for the sample of registered voters. Unfortunately, registration information was not recorded for many of the national election surveys, and the sample is therefore significantly smaller. IV estimates appear to be generally lower than the corresponding estimates for the full sample, but the large standard errors make it hard to draw firm conclusions. In the next section we show more precise results based on the larger sample available in the CPS. With the CPS, we can confirm that IV estimates for registered voters is indistinguishable from zero. Finally, when we re-estimate the models in column 1 to 3 using only the years when information on registration is available, we find results similar to the ones reported in columns 1 to 3.

4.2.2 Current Population Survey results

We now turn to an alternative data source, the Current Population Survey (CPS). The CPS has the advantage that its sample size is many times larger than the NES, and therefore can in theory produce more precise estimates. The main disadvantage of the CPS is that it does not report the state of residence at age 14, nor the state of birth. As a consequence, we need to rely on the current state of residence to assign compulsory schooling laws and child labor laws. This may be a problem if current state of residence is endogenous.

Results based on the CPS are reported in Table 4, and in general confirm those based on NES data. Column 1 shows that OLS and IV estimates for the entire sample are, respectively, 0.29 and 0.34, only slightly larger than the corresponding NES estimates. When we condition on the sample of registered voters, the IV coefficient drop to virtually 0. Because the sample here is larger, the standard error for the IV estimates is half of the corresponding standard error in Table 3. This result is strong and important, as it confirms the suggestions in the existing literature about the effect of education among the registered.

4.3 Evidence from the UK

The US results seem to indicate that the positive effect of schooling on voting may be driven largely by the effect of schooling on registration. The IV results, in particular, imply that youth obliged to attain additional education are much more likely to register to vote, and somewhat more likely to vote after becoming registered. As discussed in section 2, the responsibility of registering to vote in the US, during the period when our data were collected, rests with the individual. In contrast, the responsibility in Britain rests with regional electoral officers who send letters and visit households in order to complete the electoral register. Given the substantial differences in the registration process between the two countries, we may also expect to see differences in our estimates of the effect from schooling on voting.

OLS estimates for Britain in column 2 in Table 5 indicate that an extra year of schooling has a small but significant effect on probability of voting. Controlling for registration does not alter the estimates by much, which is not surprising considering most British are registered and that there exists little association between registration and education (see Table 1).

A comparison with US data is complicated by the fact that the UK data does not allow us to create a dummy for high school graduation. If we assume that in the US the difference in the number of years of schooling completed by those with less than high school and those with a high school degree or more is about 4 years, the coefficient for the UK appears to be six times smaller than the coefficient for the US.

The IV results for Britain are presented in Table 6. The first stage results are presented in the upper part of the table. Although there were only two school-leaving age changes in Britain from 1920 to 1995, both changes were remarkably influential in raising school attainment (see Figures 1 and 2). A particularly large fraction of British leave school as soon as possible, relative to other

industrialized countries. The 1947 change in the school-leaving age, from 14 to 15, raised the average age before leaving by 0.51, as indicated in column 2 (recall that a linear control for birth cohort is also included in this regression). Relative to those who faced a drop out age of 14, the coefficient of 0.93 on age 16 indicates British youth facing a minimum school leaving age of 16 attain almost a full year more of school, on average.

Similar to the OLS results, the IV estimates in Table 6 suggest a weak effect of schooling on voting in Britain. The nationally representative sample is too small to derive precise conclusions from the results in column 1. But the estimates from using the BES datasets that were compiled from the electoral registry are very small and insignificant.

While not shown in a table, OLS estimates based on Canadian data are qualitatively closer to UK estimates than US ones. In particular, we find that the difference in probability of voting between high school drop outs and individuals with at least a high school diploma or more is only 9.1 percentage points, after controlling for a quartic in age, sex, language, year effects, province effects, and year of birth effects. When this estimate is compared with the one in column 4 of Table 2, it indicates that the effect of high school graduation in Canada is about a third that of the US.

4.4 Misreporting of Voting Behavior

In Table 7 we provide more evidence that differential misreporting does not affect our estimates. The first row reports for convenience our baseline estimates for the US, based on the full sample of respondents (these coefficients are taken from Table 2, column 4 and Table 3, column 3). In row 2 and 3, we re-estimate the same model including only individuals whose voting status has been verified and confirmed using official voting records. Only a third of voting records have been verified, so the sample used in row 1 differ from the sample used in row 2 and 3.

In row 2, the dependent variable is the self-reported probability of voting. In row 3, the dependent variable is the verified probability of voting. The comparison between OLS estimates in row 1 and 2 indicates that the coefficient on high school graduation is slightly smaller in the smaller sample for which we have validated data. More importantly, the comparison between OLS estimates in row 2 and 3 confirms that misreporting does not significantly bias OLS estimates. They point estimates are similar: 0.021 for the self-reported voting and 0.18 for the verified voting.

In row 4, we regress a dummy variable equal to 1 if the respondent misreport her voting status on the high school graduation dummy and all the other controls. Consistent with the results in

column 4 of Table 1, the estimate in row 4 confirm that misreporting is mostly orthogonal to high school graduation. IV estimates in row 3 indicate that our results hold when verified voting status is used instead of self-reported voting status. However, the reduced sample size results in less precise estimates, making the comparison more difficult.

The bottom panel repeats the same exercise for the British data. The findings also confirm that misreporting does not appear to introduce any measurable bias in the results.

5 The Effect of Education on Citizenship Outcomes

The empirical analysis so far has focused on participation in the political system as measured by probability of voting. In this section, we extend our analysis to other measures of citizenship outcomes. For example, we look at whether and how voters obtain information about the candidates. One important potential channel through which education may improve citizenship is by raising citizens' ability and interest in obtaining information about candidates and campaigns. Another potential channel through which education may improve citizenship is by increasing citizens' involvement in community issues and their participation in community meetings.

The NES provides information on two sets of citizenship outcomes for the US. First, respondents were asked questions on actions that they have taken, such has whether they have followed the campaign on newspapers or television, or whether they regularly attend community meetings. Second, the NES collects more subjective data on respondent attitudes on the political system.

The top panel of Table 8 reports OLS and IV estimates of the effect of high school graduation on action outcomes. Because not all the questions were asked in all years, the sample size varies considerably across outcomes. As a consequence, IV estimates in some cases are not informative, because there are simply too few observations for the first stage to be effective.

Generally, the effect of education on these outcomes is to improve citizenship, when citizenship is measured by the available action outcomes. High school graduates, relative to dropouts, are more likely to be registered, follow campaigns on television or newspapers, follow public affairs, attend political meetings, volunteer for community issues and attend community meetings.

The bottom panel of Table 8 focuses on more subjective measures of the respondents' attitudes. More educated individuals are more likely to report that they are interested in elections, they don't mind jury duty, that they are more likely to trust the Federal government and less likely to think

that Federal officials are crooked.

Table 9 uses the combined Eurobarometer surveys to estimate similar effects of schooling on citizenship outcomes for the UK (with samples from both Britain and Northern Ireland). As with the BES results above, we find no relationship between registration and schooling. Among respondents, 92 percent say their name is on the electoral list for the next general election. The OLS and IV estimates of the effect of age left full-time education are insignificantly different from zero.

Least squares estimates indicate a small association with more schooling and greater likelihood of watching news in the media. Four additional years of school, for example raises the probability of watching news every day by about 3 percentage points. The instrumental variables results are not only insignificantly different from zero, but also insignificantly different from the least squares results.

All 50 Eurobarometers ask questions about whether respondents discuss politics, try to persuade people of their views, and consider themselves politically active. We find strong effects of schooling on all these variables. For example, those compelled to take an extra year of school, because the minimum school leaving age was raised, are about 7 percentage points more likely to report they try to persuade others to share their views, 6 percentage points more likely to frequently discuss political matters with friends, and 3 percentage points more likely to consider themselves politically active.

These results suggest that education improves participation not only as measured by voter turnout, but also in broader measures. As well, the evidence on education and political information may provide support for models that focus on the lower cost of information acquisition for the more highly educated. However, it may also be the case that voters who know they will not vote do not bother investing in the acquisition of political information. We leave further investigation of the channels through which education affects participation to future research.

6 Discussion

We find a strong and robust relationship between education and voting in the United States, but not in the United Kingdom. When the US sample is restricted only to citizens who are registered, the estimated effect of education on voting drops to less than a third of the effect for the full sample.

In addition, our evidence on broader outcomes indicates that education increases citizens' attention to public affairs and to following politics. More educated citizens appear to have more information on candidates and campaigns. We find similar results across both countries. Overall, these results lend support to the notion that education has social externalities through the production of a better polity.

Our results on registration suggest an interesting counterfactual — what would happen if the registration regime in the US were changed to resemble that of the UK? The answer depends on which of two distinct cases holds. On one hand, if citizens don't care about the costs of registration or they do not suffer from procrastination, then anyone who plans to vote will register. In this case, registration is a veil. Changes in the registration regime would have no impact on the education gradient of voting.

On the other hand, if costs matter or if procrastination is a concern, then a liberalization of registration could increase voting. To the extent that the registration barrier disproportionately affects the low-educated, liberalizations of the registration regime could increase the turnout of the low-educated and flatten the education gradient. As the empirical literature on the effects of registration expansion is mixed, we cannot draw any strong conclusions.

However, holding the existing US registration regime constant, our results have clear implications for citizenship behavior under our main counterfactual of interest. Our estimates suggest that an increase in educational attainment causes an increase in voter turnout in the US, but not in the UK. For the US, the magnitude for a high school graduate on the self-reported probability of voting is on the order of 28.8 to 34.2 percentage points. Given that the high school attainment rate among those 25 and older increased by 36.1 percentage points from 1964 to 2000 (US Census Bureau (2000)), our estimates suggest that the 2000 turnout rate would have been 10.4 to 12.3 percentage points lower if the high school completion rate had not changed from 1964, holding all other factors constant. In other words, we predict that the observed drop in the turnout rate would have been even sharper, if it were not for the large observed increase in high school attainment between 1964 and 2000.

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Table 1: Probability of Voting and Misreporting by Education Level

	(1)	(2)	(3)	(4)	(5)	(6)
	Self-Reported Probability of Voting		Validated Probability of Voting		Validated Probability of Misreporting	
United States	Full Sample	Conditioning on Registered to Vote	Full Sample	Conditioning On Registred vote	Full Sample	Conditioning on Registered to Vote
Less than High School	0.52	0.85	0.49	0.67	0.19	0.22
High School	0.67	0.90	0.58	0.74	0.18	0.20
Some College	0.74	0.93	0.64	0.77	0.20	0.20
College	0.84	0.95	0.74	0.82	0.14	0.15
Britain						
Finished School at Age 14 (or Less)	0.85	0.88	0.69	0.76	0.17	0.13
Finished Age 15	0.79	0.85	0.63	0.74	0.18	0.13
Finished Age 16	0.77	0.83	0.62	0.73	0.13	0.12
Finished Age 17	0.79	0.87	0.63	0.72	0.17	0.16
Finished Age 18 (or more)	0.84	0.88	0.65	0.78	0.18	0.12

Notes: United States data are from the combined National Election Studies for survey respondents. British data are from the combined 1963-97 British Election Surveys, for citizens aged 18 and over.

Table 2: OLS Estimates of the Effect of Education Attainment on the Probability of Voting in the United States

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample				**Conditioning on Registered to Vote**			
High School	0.217	0.286	0.256	0.256	0.080	0.100	0.091	0.091
	(0.005)***	(0.005)***	(0.006)***	(0.006)***	(0.017)***	(0.008)***	(0.008)***	(0.008)***
Black		-0.054	-0.014	-0.014		-0.053	-0.027	-0.027
		(0.008)***	(0.008)*	(0.008)*		(0.008)***	(0.008)*	(0.008)*
Female		-0.042	-0.041	-0.041		-0.028	-0.029	-0.029
		(0.005)***	(0.005)***	(0.005)***		(0.005)***	(0.005)***	(0.005)***
Year Effects, Quartic in Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State of Birth Effects	No	No	Yes	Yes	No	No	Yes	Yes
Year of Birth	No	No	No	Yes	No	No	No	Yes
Observations	30026	30026	30026	30026	7387	7387	7387	7387

Notes: Huber-White standard errors are shown with clustering by state and year of birth. Single, double, and triple asterix indicate significant coefficients at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 3: IV Estimates of the Effect of Education Attainment on the Probability of Voting in the United States

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample			**Conditioning on Registered to Vote**		
First Stage: Dependent Variable is High School Graduation						
Compulsory Schooling = 9	0.046		0.031	0.044		0.031
	(0.010)***		(0.011)***	(0.017)***		(0.019)***
Compulsory Schooling = 10	0.020		0.007	0.041		0.035
	(0.014)		(0.015)	(0.026)		(0.026)
Compulsory Schooling = 11 or 12	0.075		0.051	0.065		0.049
	(0.013)***		(0.015)***	(0.021)***		(0.023)***
Child Labor = 7		0.034	0.014		0.039	0.025
		(0.012)***	(0.013)		(0.020)**	(0.022)
Child Labor = 8		0.067	0.042		0.059	0.04
		(0.012)***	(0.014)***		(0.021)***	(0.024)***
Child Labor = 9		0.085	0.052		0.064	0.038
		(0.014)***	(0.016)***		(0.026)***	(0.028)
Second Stage						
High School	0.296	0.305	0.288	0.179	0.281	0.188
	(0.138)**	(0.143)**	(0.120)**	(0.254)**	(0.249)	(0.207)
Black	-0.008	-0.070	-0.009	-0.009	-0.008	-0.009
	(0.021)	(0.022)***	(0.0190)	(0.031)	(0.034)	(0.032)
Female	-0.041	-0.042	-0.041	-0.038	-0.034	-0.033
	(0.005)***	(0.005)***	(0.005)***	(0.015)***	(0.015)***	(0.014)***
Observations	30026	30026	30026	7387	7387	7387

Notes: All regressions include individual survey year and state of birth fixed effects, as well as the year of birth and a quartic in age. Huber-White standard errors are shown with clustering by state and year of birth. Single, double, and triple asterix indicate significant coefficients at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 4: Estimates of the Effect of Education Attainment on the Probability of Voting in the United States using the Current Population Survey

	(1)	(2)	(3)	(4)
	Full Sample		**Conditioning on Registered to Vote**	
	OLS	IV	OLS	IV
First Stage: Dependent Variable is High School Graduation				
Compulsory Schooling = 9		0.014 **		0.020 ***
		(0.006)		(0.006)
Compulsory Schooling = 10		0.022 ***		0.029 ***
		(0.007)		(0.007)
Compulsory Schooling = 11 or 12		0.042 ***		0.045 ***
		(0.008)		(0.008)
Child Labor = 7		-0.013		-0.018 **
		(0.008)		(0.008)
Child Labor = 8		-0.006		-0.016 **
		(0.008)		(0.008)
Child Labor = 9		-0.009		-0.015 *
		(0.009)		(0.008)
Second Stage				
High School	0.296 ***	0.342 **	0.167 ***	0.015
	(0.004)	(0.136)	(0.004)	(0.117)
Black	0.011 ***	0.017	0.009 **	-0.012
	(0.004)	(0.018)	(0.004)	(0.016)
Hispanic	-0.072 ***	-0.062 *	-0.056 ***	-0.088 ***
	(0.009)	(0.033)	(0.009)	(0.027)
Female	-0.003	-0.004	-0.017 ***	-0.015 ***
	(0.002)	(0.002)	(0.002)	(0.002)
Observations	218865	218865	176101	176101

Notes: All regressions include individual survey year and state of birth fixed effects, as well as the year of birth and a quartic in age. Huber-White standard errors are shown with clustering by state and year of birth. Single, double, and triple asterix indicate significant coefficients at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 5: OLS Estimates of the Effect of Education Attainment on the Probability of Voting in the United Kingdom

	(1)	(2)	(3)	(4)
	1997 Full Sample		**Conditioning on Registered to Vote**	
Age Finished Full-time Education	0.013	0.013	0.001	0.010
	(0.004)***	(0.004)***	(0.0015)	(0.0014)***
Female		-0.024		-0.008
		(0.015)		(0.006)
Year of Birth	No	No	Yes	Yes
Quartic in Age	Yes	Yes	Yes	Yes
Observations	3390	3390	17825	17825

All regressions include individual fixed effects for survey year, year of birth controls, and a quartic in age. Huber-White standard errors are shown with clustering by year of birth. Single, double, and triple asterisks indicates statistical significance at the 10 percent, 5 percent, and 1 percent level

Table 6: IV Estimates of the Effect of Education Attainment on the Probability of Voting in the United Kingdom

	1997 Full Sample	**Conditioning on Registered to Vote**
First Stage: Dependent Variable is Age Left Full-time Education		
Dropout Age 15	0.723	0.512
	(0.330)**	(0.097)***
Dropout Age 16	0.523	0.953
	(0.357)	(0.185)***
N	3390	18063
Second Stage		
Age Left FT Education	0.060	-0.008
	(0.059)	(0.018)
Female	-0.030	-0.009
	(0.014)**	(0.006)
Observations	3390	17825

All regressions include individual fixed effects for survey year, year of birth controls, and a quartic in age. Huber-White standard errors are shown with clustering by year of birth. Single, double, and triple asterisks indicates statistical significance at the 10 percent, 5 percent, and 1 percent level respectively.

Table 7: The Effect of Education Attainment on Self-reported versus Verified Voting

		OLS	IV	N
United States General Election Survey: Coefficient on Graduated from High School				
Voted Last Election (Self-Reported)	Full sample	0.256 (0.006)***	0.288 (0.120)**	30026
Voted Last Election (Self-Reported)	Smaller sample	0.208 (0.006)***	0.061 (0.148)**	11480
Voted Last Election (Verified)		0.184 (0.009)***	0.438 (0.151)***	11480
Mis-reported Voting Behavior		-0.008 (0.009)	-0.43 (-0.14)****	11480
British General Election Survey, Coefficient on Age Finished Full-time School				
Voted Last Election (Self-Reported)		0.010 (0.001)***	-0.008 (0.018)	17825
Voted Last Election (Verified)		0.007 (0.002)***	0.008 (0.027)	10229
Mis-reported Voting Behavior		-0.001 (0.002)	-0.004 (0.027)	10229

Notes: All regressions include individual fixed effects for survey year, year of birth controls, and a quartic in age. US results also include state fixed effects. Huber-White standard errors are shown with clustering by year of birth (and state for the US). Single, double, and triple asterisks indicates statistical significance at the 10 percent, 5 percent, and 1 percent level respectively.

Table 8: The Effect of Education Attainment on Social and Citizenship Outcomes in the United States

	Mean	OLS	IV	Number of Observations
Self-Reported Action Outcomes				
Registered to Vote	0.82	0.187 (0.005)***	0.093 (0.097)	20328
Follow Campaign on TV	0.79	0.087 (0.006)***	0.392 (0.116)***	23179
Follow Campaign on Newspapers	0.66	0.268 (0.006)***	0.852 (0.139)***	25301
Follow Public Affairs	0.66	0.237 (0.007)***	0.544 (0.126)***	25500
Attend Political Meeting	0.07	0.064 (0.003)***	0.132 (0.074)*	20328
Work on Community Issues	0.25	0.171 (0.019)***	-0.036 (0.751)	3855
Attend Community Meetings	0.30	0.235 (0.049)***	-1.000 (0.821)	1024
Self-reported Subjective Outcomes				
Interested in Election	0.30	0.166 (0.006)***	0.270 (0.132)**	30199
Does not mind Jury Duty	0.59	0.183 (0.022)***	1.510 (1.490)	3821
Trust Federal Government	0.40	0.050 (0.007)***	0.353 (0.159)	25136
Trust People	0.50	0.231 (0.010)***	0.330 (0.197)*	12007
Federal Officials are Crooked	0.40	-0.051 (0.008)***	-0.175 (0.176)	22304

Notes: All regressions include gender, race, individual survey year and state of birth fixed effects, as well as the year of birth and a quartic in age. Huber-White standard errors are shown with clustering by state and year of birth. Single, double, and triple asterix indicate significant coefficients at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 9: The Effect of Education Attainment on Social and Citizenship Outcomes in the United Kingdom

	Mean	OLS	IV	Number of Observations
Self-Reported Action Outcomes				
Name on Electoral List for Next General Election	0.92	0.000 0.001	-0.014 0.009	36490
Follow News Everyday from TV, newspaper, or radio	0.90	0.007 (0.001)***	-0.007 (0.049)	22935
Seldom or Never Follow News from TV, newspaper, or radio	0.01	-0.002 (0.0003)***	0.000 (0.017)	22935
Often Try to Persuade Friends, Relatives, Co-workers to Share Views	0.12	0.007 (0.0007)***	0.011 (0.015)	63858
Never Discuss Opinions or Persuade Others to Share Views	0.24	-0.041 (0.001)***	-0.095 (0.025)***	62310
Often or from Time to Time Try to Persuade Friends, Relatives, Co-Workers to Share Views	0.45	0.029 (0.001)***	0.066 (0.019)***	63858
Discuss Political Matters with Friends Frequently	0.15	0.020 (0.001)***	0.066 (0.018)***	62527
Discuss Political Matters with Friends at Least Occasionally	0.67	0.041 (0.001)***	0.095 (0.026)***	62527
Never Discuss Political Matters with Friends	0.33	-0.041 (0.001)***	-0.092 (0.025)***	62527
Self-reported Subjective Outcomes				
Consider oneself Politically Active	0.10	0.002 (0.001)***	0.033 (0.014)**	62310
Consider Oneself to be Fairly Close or Very Close to One Party	0.29	0.016 (0.001)***	0.012 (0.030)	41721
Satisfied with the Way Democracy Works	2.54	-0.023 (0.002)***	-0.003 (0.040)	44174
Give People More Say in Important Government Decisions	0.50	-0.003 (0.001)**	-0.002 (0.022)	48406

Notes: All regressions include gender, individual survey year and region fixed effects, as well as the year of birth and a quartic in age. Huber-White standard errors are shown with clustering by region and year of birth. Single, double, and triple asterix indicate significant coefficients at the 10 percent, 5 percent, and 1 percent levels respectively.

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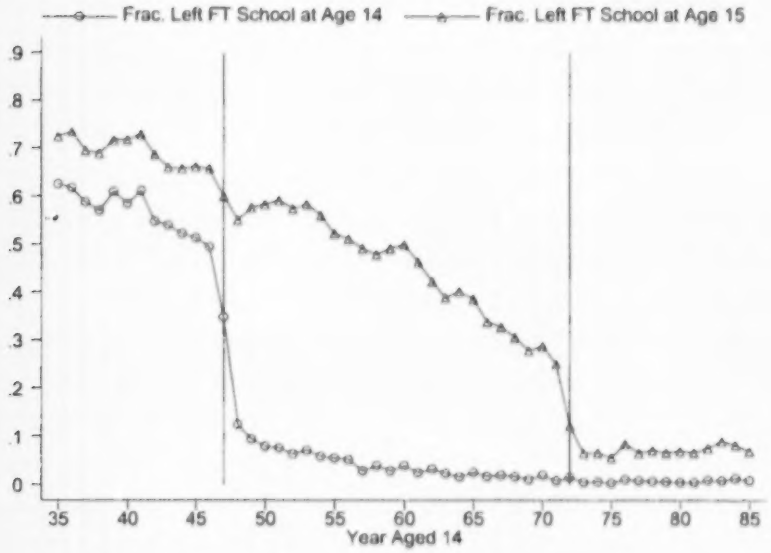
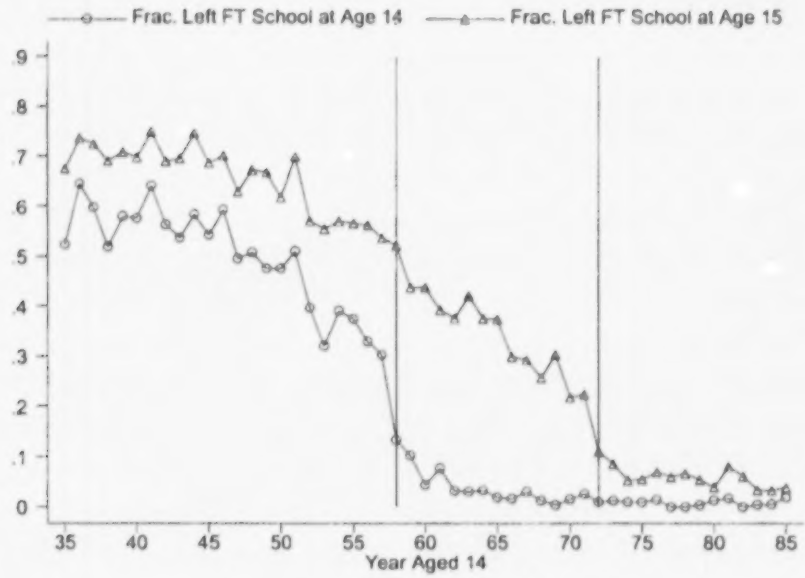
Figure 1: Fraction Left Full-Time Education by Year Aged 14 and 15 in Great Britain



Notes: The lower line shows the proportion of British-born adults aged 16 to 65 from the 1973 to 1998 Eurobarometer Surveys who report leaving full-time education at, or before, age 14. The upper line shows the same, but for age 15.

Figure 2: Fraction Left Full-Time Education by Year Aged 14 and 15 in Northern Ireland



Notes: The lower line shows the proportion of Northern Irish adults aged 16 to 65 from the 1973 to 1978 Eurobarometer Surveys who report leaving full-time education at, or before, age 14. The upper line shows the same, but for age 15.

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